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How Broadband Deployment Skews Economic/Business Growth

Summary: Precursor believes many do not appreciate the **broad investment and economic implications of the highly skewed nature of current broadband deployment**. While nearly all large businesses in the U.S. *already have* broadband service, only around 6.5 million or roughly 6% of residential households have broadband—73% cable modem and 26% DSL (see attached chart). More importantly, investors are missing entirely the broad implications of meager broadband deployment to small and medium enterprises (SMEs) that employ less than 100 employees. Investors should care because **SMEs comprise roughly 85% of U.S. business firms, 40% of employment, and one-third of the nation's economic output**. The broadband deployment contrast between large businesses and SMEs is stark. Only about **6% of SMEs have broadband** and this segment is almost exclusively DSL (~90% see attached chart). Precursor has discovered that the SMEs, which need broadband most, are also the least likely to get broadband deployment. That's because distance from network hubs increases the business need for broadband at the same time distance increases cost of deployment. Precursor believes this **broadband skew has broad under appreciated implications for productivity and earnings growth**. If large companies, which enjoy broadband productivity gains, are experiencing slower growth, this signals relatively greater trouble for SMEs, which are not enjoying broadband productivity gains. This could be a hidden negative precursor for economic growth because **SMEs are the primary driver of national job and economic growth** and productivity is a key driver of earnings growth.

Implications of Skewed Broadband Deployment: (1) **Distance Matters Much More for Broadband Than Dial-up:** (A) **Cost:** Unlike narrowband dial-up which requires minor modification of the telecom network, DSL and cable modems require an expensive re-engineering of their respective networks. Thus the key broadband cost variable is density/distance: how far away and how far apart the customers are, because density/distance drives average cost. Customer density matters to DSL specifically because speed directly correlates to the distance from the central office. Customer density matters to both DSL and cable because it creates breakeven efficiencies in marketing, engineering, installation, and service. (B) **Revenues:** Customer ability to pay drives average revenues. Relative customer ability to pay is also important because it drives the priority sequence of deployment and also whether deployment can ever reach breakeven in a given area. These cost and revenue realities heavily skew broadband deployment to the biggest cities with the most concentrated business districts and the most affluent, concentrated neighborhoods. Moreover,

because cable's entertainment-driven infrastructure almost exclusively serves the residential market, cable modem deployment is unlikely to be a factor for SMEs. Given the financial difficulties that CLECs are experiencing, it looks like the SME market will increasingly become the exclusive domain of DSL. (2) **Broadband Deployment Paradox:** Ironically, the geographic areas that make the least business sense to deploy to are precisely the businesses that most need broadband to grow. A substantial portion of U.S. employment is generated by SMEs, and most employment tends not to be located in the densest, highest rent areas where it makes most business sense to deploy broadband. Precursor suggests a *surprising correlation*: those SMEs that require lots of physical space and low rent also tend to have the most mission critical need for broadband. For example: engineering, manufacturing and construction firms that regularly use computer-aided design (CAD) need broadband to transmit schematics/blueprints efficiently; yet only about 10% have broadband. Farmers and construction companies that need equipment parts have a mission critical need for broadband to efficiently scan schematics and participate in auctions for spare parts; yet only about 10% have broadband. Some other small businesses, which need broadband, but tend to be dispersed from where broadband is being deployed include: residential rural doctors (which need bandwidth to view x-rays and CAT scans from hospitals and specialists), travel agents, and printing companies – to name some of the more obvious industries with largely unmet broadband needs. This suggests a **broadband investment cleave that could advantage: large/mid cap over small/micro cap companies**; concentrated/geographically-clustered industries over fragmented and dispersed industries; and high-rent industries over low rent industries. (3) **Home-to-Office Telecommuting Hindered:** To remain a proprietary network, cable broadband networks have been designed to prevent cable customers from being able to link at high speed with DSL—unless it is cable-provided DSL (a de minimis share of SMEs). This effectively prevents a cable modem telecommuter working from home from linking at high speed into their office's DSL network. On a broader scale, it also prevents the creation of integrated suburban-urban metro-wide high-speed networks. This is another hidden drag on future productivity growth. (4) **Broadband Job Flight:** Increasingly states and localities are realizing that broadband is a mission critical utility for business and a core factor in attracting or keeping businesses in a locality or state. Broadband increasingly is a prerequisite for growth. **This has positive implications for relatively broadband rich REITs and negative implications for relatively broadband poor REITs.** *Geo-economic data source:* www.imapdata.com * * * * *

Precursor Watch®: Broadband Deployment Outlook

SMALL BUSINESS ¹			RESIDENTIAL															
Residential Provider	SME	SME	Estimated Residential Subscribers (000s)				Total Res. Subs.	Res. Market Share	Est. "Footprint" Growth			Approximate Retail Pricing	Download Speed	Upload Speed	Spectrum (Mhz)			
	Subs. (000s)	Market Share							2001	2002	2003				Available	% allocated for data		
Wireline			1H99	2H99	1H00	2H00												
✓ Cable Modem Cable and AT&T	0*	~0%	950	750	1,200	1,825	4,725	73%										
✓ xDSL ILEC, CLEC, IXC	720	90%	100	200	555	855	1,710	26%										
✓ Overbuilders RCN (cable modem)	0	0%	13	9	18	27	67	1%										
Terrestrial Wireless²																		
Digital TV Geocast/iBlast/WaveExpress (54-746 MHz)	0	0%	0	0	0	0	0	0%	Supplemental service; 1-way			n/a						
✓ Wireless Local Loop AT&T Digital Broadband (1.8-2.1, 2.3 GHz)	0	0%	0	0	3	7	10	~0%										
✓ MMDS ("wireless cable") ³ Sprint/Worldcom/Nucentrix (2.1, 2.5-2.7 GHz)	11	1%	1	0*	0*	0*	1	~0%										
✓ LMDS Winstar/Teligent/XO/etc. (24, 28/31, & 39 GHz)	70	9%	0*	0*	0*	0*	0*	0%	Not targeting residential			n/a	n/a	n/a	n/a	n/a		
3G Mobile Wireless Mobile Providers, et. al. (spectrum not yet allocated)	0	0%	0	0	0	0	0	0%	Not a direct competitor			n/a			n/a			
Satellite⁴																		
✓ Starband (Gilat) (Ku band: 10-18 GHz)	0*	0%	n/a	n/a	n/a	0*	0*	~0%							n/a	n/a		
Hughes DirecPC ⁵ (Ku band: 10-18 GHz)	23	0% ⁵	35	0*	0*	0*	35	0% ⁵	Satellite targets unserved rural areas; DirecPC still 1-way						n/a	n/a		
Totals	824	100%	1,099	959	1,776	2,714	6,548	100%										

KEY: (✓) Depicts **broadband** service, defined by the FCC as 200 kbps *both ways* (@Home & SBC upload speed is 128 kbps and Verizon upload speed is 90 kbps upload speed at prices listed above; a few cable modems and MMDS systems still use dial-up return.) **Footprint:** Assuming ~100m U.S. households, circles depict estimated growth over time. **Pricing/Speed:** We show price/speed packages for broadband *plus Internet service* likely to have mass market appeal; circles depict speed/size of "pipe." (1) SME market shown here excludes businesses using certain high-speed access lines such as ISDN, T-1, T-3, etc. (2) Some spectrum (e.g., 700MHz and unlicensed spectrum) is either not yet available, niche use, or both. (3) Many MMDS 2-way licenses awaiting FCC approval ~1H01. (4) Planned systems include: Skybridge (Ku-band) and WildBlue, Hughes' Spaceway & Teledesic (Ka 18-30 GHz). (5) DirecPC's subscriber totals not included in market share calculation because service uses dial-up return path; 2-way service and new pricing information due out ~1Q01, upload speed will be ~128 kbps. (*) Amount is negligible.